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Environmental Restoration Program

SITE RECONNAISSANCE SCOPING REPORT OPERABLE UNIT 2

MOUND PLANT
MIAMISBURG, OHIO

November 1995

FINAL

(Revision 0)

Department of Energy
Ohio Field Office

Environmental Restoration Program
EG&G Mound Applied Technologies

ENVIRONMENTAL RESTORATION PROGRAM

SITE RECONNAISSANCE SCOPING REPORT

OPERABLE UNIT 2

MOUND PLANT

MIAMISBURG, OHIO

NOVEMBER 1995

DEPARTMENT OF ENERGY

OHIO FIELD OFFICE

ENVIRONMENTAL RESTORATION PROGRAM

EG&G MOUND APPLIED TECHNOLOGIES

FINAL

(REVISION 0)

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LIST OF ACRONYMS
MOUND PLANT, ER PROGRAM

AEC	Atomic Energy Commission
AST	aboveground storage tank
ASTM	American Society for Testing Materials
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
DOE	U.S. Department of Energy
DTW	depth to water
ER	Environmental Restoration (Program)
FFA	Federal Facility Agreement
IR	infrared
IRA	Interim Remedial Action
MRC	Monsanto Research Corporation
MW	monitoring well
NCP	National Contingency Plan
NPL	National Priorities List
OEPA	Ohio Environmental Protection Agency
RD/RA	remedial design/remedial action
RI/FS	remedial investigation/feasibility study
SARA	Superfund Amendments and Reauthorization Act
TEGD	Technical Enforcement Guidance Document
TOC	total organic carbon
USEPA	U.S. Environmental Protection Agency

1. INTRODUCTION

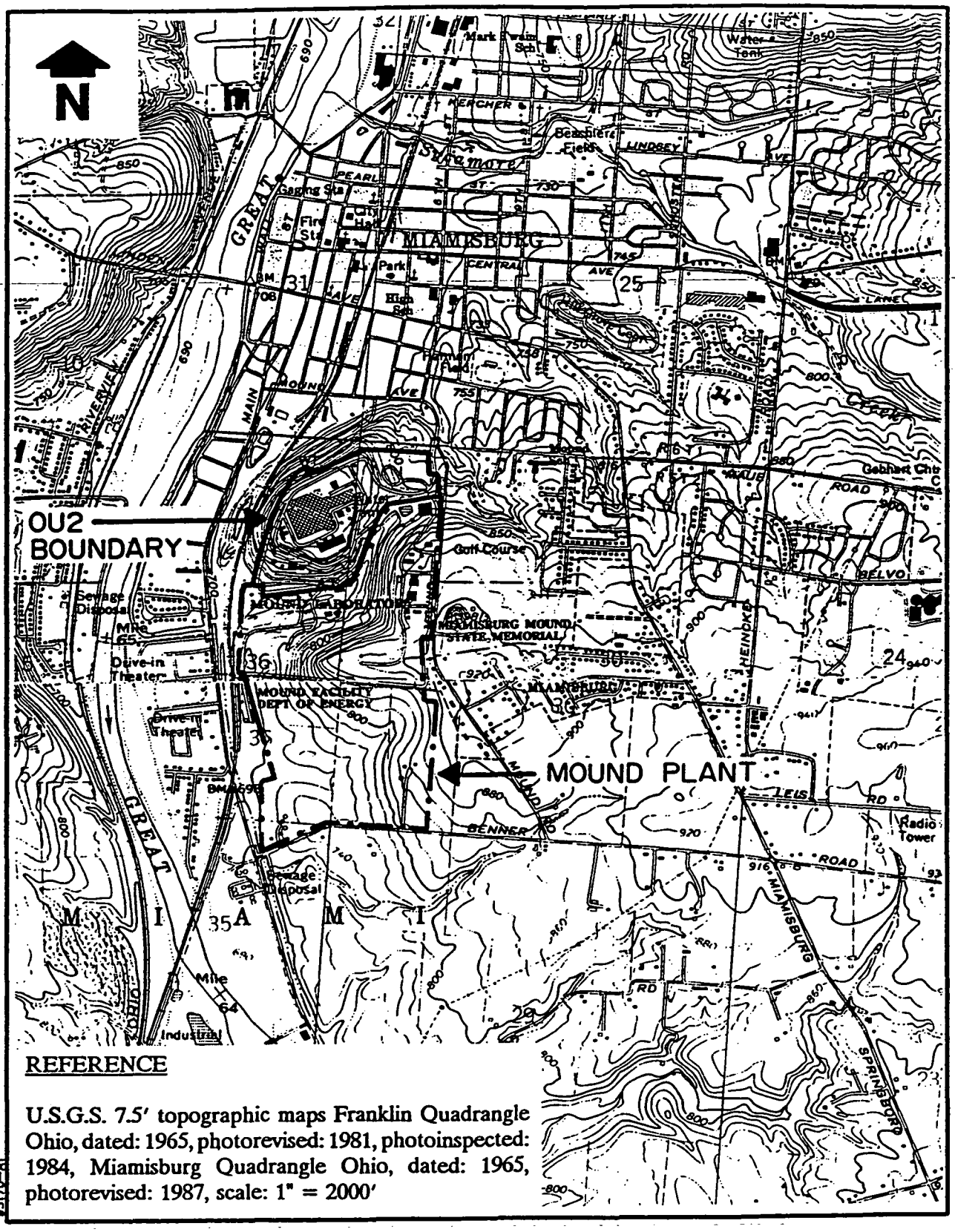
1.1. HISTORY OF MOUND PLANT

Mound Plant originated as part of the Manhattan Engineer District in 1943; its purpose was to determine the chemical and metallurgical properties of polonium (DOE 1986). The work was performed for the U.S. Army at several locations in Dayton, Ohio, by Monsanto Research Corporation (MRC). In 1946, 182 acres were purchased for the permanent Mound Plant Site on the outskirts of the city of Miamisburg, in Montgomery County, Ohio (Figure 1.1). Construction of the new facility began in February 1947, with the construction of 14 buildings. The site is approximately 10 miles south-southwest of Dayton and 45 miles north of Cincinnati. In 1948, work being performed at the Dayton units was moved to Mound Plant, and in January 1949, operations involving radionuclides began. Some of the Dayton units were dismantled in 1950 and moved to Mound Plant to allow the short-lived polonium-210 (half-life 138 days) to decay.

In addition to investigating the chemical and metallurgical properties of polonium-210, early Mound Plant programs investigated its applications, particularly the fabrication of neutron and alpha sources for weapon and nonweapon use. Investigations involving uranium, protactinium-231, and plutonium-239 were performed from 1950 to 1963 as part of the national civilian power reactor program. In 1954, work began on the separation of stable isotopes of noble gases. Also in 1954, a thermoelectric generator fueled with polonium-210 was invented at Mound Plant and patented. This invention utilized heat from the radioactive decay of polonium-210. In 1961, development of plutonium-238 heat sources started at Mound Plant because of its high specific activity and relatively short half-life (87.74 years). As a result of the decline of polonium research, Mound Plant began a thorium-232 refining program using thorium ore sludges.

The first of several programs requiring tritium-handling technology was initiated in 1958. Today, Mound Plant has an extensive capability for handling and studying tritium and tritium compounds for weapons and nonweapons applications. A facility also exists for the recovery and purification of tritium from all types of wastes generated at DOE sites that handle tritium. Facilities also exist for the development of tritium-containing materials and processes for weapons applications and possible manufacture (MRC 1985). The Mound Plant also processed and fabricated explosive powders and detonators.

In the early 1970s, as national concerns about the environment and the conservation of resources grew, Mound Plant expanded its comprehensive programs in environmental control, waste management, and energy conservation. In January 1975, Mound Plant formally came under the jurisdiction of the Energy Research and Development Administration upon dissolution of the Atomic Energy Commission (AEC). In October 1977, Mound Plant was incorporated into DOE.



REFERENCE

U.S.G.S. 7.5′ topographic maps Franklin Quadrangle Ohio, dated: 1965, photorevised: 1981, photoinspected: 1984, Miamisburg Quadrangle Ohio, dated: 1965, photorevised: 1987, scale: 1" = 2000′

Figure 1.1. Location of Mound Plant, Miamisburg, Ohio

1.2. ENVIRONMENTAL RESTORATION PROGRAM

As a result of historical disposal practices and contaminant releases to the environment, Mound Plant was placed on the Comprehensive Environmental Response, Conservation and Liability Act (CERCLA), National Priority List (NPL) in November of 1989. DOE and the U.S. Environmental Protection Agency (USEPA) signed a Federal Facility Agreement (FFA) in October of 1990. In 1993, the FFA was modified to include the Ohio Environmental Protection Agency (OEPA).

The FFA requires DOE to develop and implement Remedial Investigation/Feasibility Studies (RI/FSs) and conduct interim remedial actions in order to investigate environmental impact from past or present activities and perform appropriate actions to protect human health and the environment.

The ER program at Mound Plant, consists of three phases, and is patterned after the USEPA CERCLA program. Phase I, Preliminary Assessment/Site Inspection was completed at Mound Plant in 1986 and was reported in the Installation Assessment Report (DOE 1986). Phase II, a RI/FS, is currently underway at Mound Plant. Phase III, Remedial Design/Remedial Action (RD/RA) will implement remedial alternatives chosen in the Feasibility Study of Phase II.

1.3. OU-2 PHASE 1 - SITE RECONNAISSANCE INVESTIGATION

The OU-2 remedial investigation was divided into three phases so that data from a prior phase can be used to direct and focus the efforts of subsequent phases of data collection. These three phases include:

- Phase 1 - Site Reconnaissance Investigation
- Phase 2 - Source Confirmation Investigation
- Phase 3 - Nature and Extent Investigation

The Phase 1 - Site Reconnaissance Investigation (SRI) consisted of five tasks:

- Task 1 - Bedrock Topography Mapping
- Task 2 - Subsurface Utility Evaluation
- Task 3 - Soil Vapor Reconnaissance
- Task 4 - Existing Monitoring Wells Evaluation
- Task 5 - Characterization of Main Hill Seeps and Foundation Drains

The objectives of the OU-2 RI/FS are to define the nature and extent of contamination on the Main Hill, characterize the risks to human health and the environment posed by exposure to affected media, to evaluate potential remedies and to determine the affect of potential releases of contaminants to groundwater. The

objective for Phase 1 of this investigation, was to obtain information to help establish the scope for the subsequent phases of the investigation.

1.4. SCOPE AND ORGANIZATION OF REPORT

This report provides a summary of the OU-2 Phase 1 - SRI activities. It provides a summary of results and conclusions for each of the five tasks performed as part of the SRI. In addition, this report provides recommendations for interim response actions (IRAs), additional investigations and modifications to the OU-2 Phase 2 - Source Confirmation Investigation and Phase 3 - Nature and Extent Investigation. The following sections are provided in this report:

- Section 1, Introduction - Includes a discussion of Mound Plant history, the ER Program and operable unit organization.
- Section 2, Site Reconnaissance Investigation - Provides a summary of the Bedrock Topography Mapping, Subsurface Utility Evaluation, Soil Vapor Reconnaissance, Existing Monitoring Well Evaluation, and Characterization of Main Hill Seeps and Drains.
- Section 3, IRA Task Recommendations - Presents specific areas recommended for IRAs, a and a brief justification for performing an IRA.
- Section 4, Recommendations for Additional Investigations - Presents recommendations for additional investigations or modifications to planned Phase II and III activities.
- Section 5, References - Provides a list of documents referenced throughout this report.

2. SITE RECONNAISSANCE INVESTIGATION

2.1. BEDROCK TOPOGRAPHY MAPPING

Information obtained during the geophysical investigations along with previous information (boring logs) were used to produce several maps of the bedrock beneath OU-2. These maps include:

- Figure 2.1. Seismic Layer V2 Contour Map
- Figure 2.2. Top of Highly Fractured Bedrock Map
- Figure 2.3. Isopach Map - Interpreted Zone of Highly Fractured Bedrock

Figure 2.2 shows linear depressions in the top of the highly fractured bedrock around the perimeter of OU-2 with slight mounds and depressions in the interior of OU-2. Perimeter depressions are generally aligned with regional lineations identified during the fracture trace analysis (N50°W to N60°W, N30°W, and N10°E to N20°E). A linear depression beneath OSE Building is generally aligned with seep 0604/0604. The thickness of the highly fractured bedrock in the area of OSE Building is interpreted to be less than five feet as shown in Figure 2.3. The conceptual model of the site interpreted the thickness of the highly fractured bedrock to be a uniform 50 feet. Figure 2.3 shows the thickness of the highly fractured bedrock to vary from 0 to approximately 30 feet.

The top of the less weathered/fractured bedrock shows a linear depression northwest of OSE Building (Figure 2.1). This depression trends N10°E to N20°E and is generally aligned with seeps 0604/0605 and 0606. The elevation of these seeps corresponds to the basal portion of the Liberty Formation which is dominated by shale, as opposed to limestone in the upper portion of the formation. This linear depression may enhance the migration of groundwater to the seeps along the top of the less permeable shales.

Based on groundwater elevation and boring information, groundwater within OU-2 occurs within the less weathered/fractured bedrock, supporting the current conceptual model of the site.

The bottom of the less fractured bedrock (top of competent bedrock) at OU-2 could not be assessed with the seismic program planned for Phase I. It is possible to define the top of competent bedrock using seismic refraction, however, to achieve the required depth of penetration, longer spreads with offset shotpoints would be required. The energy source used at OU-2 was a plate and hammer. A higher energy source is required (explosives or other specially designed devices) for utilizing longer spreads and offset shotpoints. This is unfavorable along the roads and cultural structures on the site as they would be damaged. However, longer seismic refraction profiles with offset shotpoints could be performed on the flanks of the Main Hill. Properly designed seismic profiles at those locations would complement the

information obtained in this study and give a better estimate of the depth and configuration of competent bedrock. The results of the effort may lead to the conclusion that further geophysical investigations may not be necessary, however if further studies seems appropriate, an amendment to the OU2 Work Plan will be issued to the regulators for review and approval.

2.2. SUBSURFACE UTILITY EVALUATION

Existing drawings of subsurface utilities and surface drainage were obtained from Mound Plant's CAD department in electronic format. The drawings obtained from Mound Plant included:

- Storm and sanitary sewers
- Fire and domestic water lines
- Radioactive waste lines
- Electric, ADT, and telephone lines
- Utility trenches
- Surface drainage and topography

Verification of these drawings was performed by comparing the location of manholes in the field with their location on the drawings. Restricted access and absence of manholes limited the verification of the utility trenches and prevented the verification of the fire and domestic water lines. Phase II investigations will include revisiting of these restricted areas.

Accessible storm and sanitary sewer lines eight inches in diameter or larger were video taped in order to begin to evaluate the integrity of these lines. Approximately 12,000 feet of storm and sewer lines were video taped; the remaining lines were inaccessible due to bends in the lines, crushed lines, size of the access manhole, and sediment and debris that could not be cleaned from the lines. The video tapes documented the condition of the lines. The location and conditions observed during the video inspection are summarized on Plates B.1, B.2, and B.3 in Appendix B of the Subsurface Utility Technical Memorandum (DOE 1994).

A leakage rate of 4.5 gpm was calculated using the cycle time of a jockey pump used to repressurize the fire lines from below 75 psi to 115 psi. Using this leakage rate, an estimated 2.3 million gallons of water are lost across the entire Mound Plant site in one year. This is an acceptable amount as per the American Water Association based on the total linear feet at the Mound site.

Field reconnaissance of surface drainage features identified 18 potential areas of contaminant concentration (ponding) and infiltration to the subsurface.

A database of sumps and tanks within OU-2 was prepared utilizing information from previous investigations. The database identified 102 sumps and tanks within OU-2. Tank number 262 was installed when G Building

was constructed and appears to be located under the present GW Building location. No information was available as to whether this tank was removed or closed-in-place. A visual inspection of aboveground storage tanks (ASTs) located within OU-2 identified two ASTs of concern; AST-11 with visible staining on a concrete pad and AST-17 which had a ruptured bottom. AST-11 located east of PS Building, reportedly contained diesel fuel, however this AST was roped off and had cautions marked caustic. Both AST's are no longer in service.

2.3. SOIL VAPOR RECONNAISSANCE

A soil vapor survey was performed in order to identify areas within OU-2 that would require remedial activities or additional investigations. Soil vapor samples were collected in the vicinity of the Paint Shop, M, WD, DS, Gand GW buildings. Contaminants were detected in all sampling areas. Table II.1 shows the range of total VOCs reported in areas investigated.

Table II.1. Soil Vapor TVOC Ranges

Sample Areas	TVOC Concentration Range (ppb)
Paint Shop	<1,975 to 42,028
M Building	<2,857 to 34,967
WD Building	<2,500 to 22,501
DS building	<1,607 to 49,481
G Building	<536 to 2,983
GW Building	<536 to 7,260

ppb = parts per billion

VOCs were not reported in the area between M and E Buildings, however, sampling efforts were hindered by underground utilities. This area will be further assessed in Phase II based on the fact that some utilities may be abandoned at that time. Copies of the laboratory results along with sampling details are provided in the Soil Vapor Reconnassance Technical Memordanum (DOE 1994a).

2.4. EXISTING MONITORING WELL EVALUATION

Forty-one groundwater monitoring wells were evaluated for their suitability to provide future RI/FS groundwater data. The evaluation focused on the construction of the monitoring wells using available well contruction diagrams, video inspection, and natural gamma logging. Seven existing groundwater monitoring wells within OU-2 were determined to be suitable for the collection of water quality and elevation data for the RI/FS.

Eleven wells located outside of OU-2 and 4 additional wells within OU-2 were determined as acceptable for collecting elevation data. The remaining 19 wells did not meet the ASTM and TEGD construction standards (DOE 1995b) and are not recommended for RI/FS data collection. All wells that were determined to be suitable are listed in the Monitoring Well Evaluation Technical Memorandum

2.5. CHARACTERIZATION OF MAIN HILLS SEEPS AND FOUNDATION DRAINS

The preliminary investigation of Main Hill seeps and foundation drains was performed in order to begin to evaluate the source of water and contamination in the seeps. Site Reconnaissance and color infrared (IR) photograhy was used to identify seep locations and provide preliminary characterization of the seeps. Foundation drains were assessed based on drawings provided by Mound and Interviews with Mound Plant personnel.

Seeps located along the south and west sides of the Main Hill occur at elevations of 770 to 790 feet msl. The occurence of numerous seeps at similar elevations suggests that groundwater may be percolating downward until a less permeable strata is encountered and then migrating along that strata until the water exits on the hill sides. Seeps 0601 and 0607 appear to have almost immediate response to rainfall events, indicating the potential of preferential subsurface pathways for groundwater flow. The correlation of precipitation events to seep flow for the remaining seeps is uncertain. The Main Hill seeps were sampled in June 1994 for pH, conductivity, temperature, and flow. The results of the seep sampling is presented in the Characterization of Main Hill Seeps and Drains Technical Memorandum (DOE 1994c).

Two foundation drains are monitored daily for tritium (Building 48 and T Building). The results can be found in the Characterization of Main Hill Seeps and Foundation Drains Technical Memorandum. The foundation drain for Building 48 flows into a catch basin located on the northwest corner of the building. T Buildings foundation drain flows into an outfall pipe located on the hill side, west of HH Building. These foundation drains are sampled in the catch basin and in an open unlined drainage ditch for Building 48 and T building, respectively. The sampling locations for these drains are open to surface drainage and runoff which may alter the sampling results from the foundation drains. A review of Mound Facilities building plans indicated foundation drains for other buildings within OU-2 are generally discharged directly to the underlying bedrock or to storm and sanitary sewers.

3. IRA TASK RECOMMENDATIONS

This section presents a number of areas within OU-2 that may be candidates for IRA under the DOE/CERCLA program. This section discusses the regulatory basis for conducting an IRA, the statutory limitations on IRAs, and a number potential of IRA areas within OU-2.

3.1. REGULATORY BASIS OF INTERIM REMEDIAL ACTION

Section VII.D of the 1993 FFA indicates that nothing shall alter DOEs authority with respect to removal actions conducted pursuant to Section 104 of CERCLA as amended by the Superfund Amendments and Reauthorization Act (SARA). •Section 104.(a)(1) of CERCLA as amended grants the following response authorities:

> Whenever (A) any hazardous substances is released or there is a substantial threat of such a release into the environment, or (B) there is a release or substantial threat of release into the environment of any pollutant or contaminant which may present an imminent and substantial danger to the public health or welfare, the President is authorized to act, consistent with the national contingency plan, to remove or arrange for the removal of, and provide for remedial action relating to such hazardous substance, pollutant, or contaminant at any time (including its removal from any contaminated natural resource), or take any other response measure consistent with the national contingency plan which the President deems necessary to protect the public health or welfare or the environment.

Executive Order 12580 delegates to the DOE authority to conduct emergency and non-emergency removal actions with respect to releases or threatened releases from DOE facilities; thus, wherever CERCLA refers to the President's authority, that authority has been delegated to the Secretary of Energy for DOE facilities.

Subpart E of the National Contingency Plan (NCP) establishes methods and criteria for determining the appropriate extent of response authorized by CERCLA when there is a release of a hazardous substance into the environment or there is a release into the environment of any pollutant or contaminant that may present an imminent and substantial danger to the public health or welfare (40 CFR 300.400(a)). Limitations on appropriate responses are established by 40 CFR 300.400(b):

> Unless the lead agency determines that a release constitutes a public health or environmental emergency and no other person with the authority and capability to respond will do so in a timely manner, a removal or remedial action under Section 10 of CERCLA shall not be undertaken in response to a release:
>
> (1) Of a naturally occurring substance in its unaltered form, or altered solely through naturally occurring processes or phenomena, from a location where it is naturally found;

(2) From products that are part of the structure, and result in exposure within, residential buildings or business or community structures; or

(3) Into public or private drinking water supplies due to deterioration of the system through ordinary use.

3.1.1. Removal Actions and Interim Remedial Actions

Section 104.(a)(2) of CERCLA, as amended, states that "any removal action undertaken by the President under this subsection (or by any other person referred to in section 122) should, to the extent the President deems practicable, contribute to the efficient performance of any long-term remedial action with respect to the release or threatened release concerned."

In the FFA, DOE agreed to conduct IRAs. Section VI.J of the FFA defines IRAs as follows:

> "Interim Remedial Actions" or "IRA" shall mean all discrete response actions implemented prior to a final remedial action which are consistent with the final remedial action and which are taken to prevent or minimize the release of hazardous substance, pollutants or contaminants so that they do not migrate or endanger public health, welfare or the environment.

Both removal actions and IRAs are response actions implemented prior to a final remedial action, and both must be consistent with the final remedial action. Accordingly, removal actions undertaken by DOE under the authority granted by Section 1049(a)(1) of CERCLA, as amended, and Executive Order 12580; and performed according to 40 CFR 300.415, shall be referred to as IRAs throughout the remainder of this report.

3.1.2 Statutory Limits on IRAs

Under paragraph (b)(3) of Section 300.65 of the NCP, the cost and duration of fund-financed interim remedial actions must be limited to less than $2 million and 12 months. All fund-financed interim remedial actions must satisfy these requirements. Although the IRA at the B Building solvent storage shed area is not financed by Superfund, the intent of the IRA is the same; to quickly mitigate potential risks and continued chemical migration in a cost-efficient manner. These financial and temporal constraints will be used as guidelines and screening tools for evaluating potential remedial action alternatives at the site.

There are two types of exemptions on these limitations: the emergency waiver, and the consistency waiver. The emergency waiver provides for additional funding for an emergency response action. The consistency waiver provides for additional funding to implement a removal action which exceeds the $2,000,000 limit, but would be consistent with final remedial actions.

3.2. SPECIFIC IRA TASK RECOMMENDATIONS

3.2.1. Well Abandonment

Several monitoring wells within OU-2 are recommended for IRAs based on existing contamination or the potential to provide migration pathways that may impact drinking water supplies. The likely remedial alternative in remediating these wells is abandonment, however all options will be evaluated in preparation of a Removal Site Evaluation/Action Memorandum (RSE/AM).

Monitoring Well 0034

Monitoring Well (MW) 0034 is located on the southeast edge of the Main Hill at the base of a slope beneath the paint shop, powerhouse and DS building. Free-floating petroleum hydrocarbon (free product) was reported by Mound personnel. The type of free product is unknown. Mound Plant personnel also reported that stained soil was observed in the immediate area of MW 0034.

MW 0034 was installed in May 1976 as part of a Potable Water Standards Project. The well was completed in unweathered shale at a depth of 20 feet below ground surface (BGS). The OU-2 Monitoring Well Survey Technical Memorandum (DOE 1995b) indicates that MW 0034 does not meet the standards set forth in USEPA's Technical Enforcement Guidance Document (TEGD) for monitoring well construction (earthen backfill).

Free product in the well, potential subsurface migration, and possible exposure to human populations and animals from contaminated surface soils justify the preparation of an RSE/AM. The memorandum will evaluate whether MW 0034 is appropriate for an IRA and include potential remedial alternatives. The RSE/AM will include a proposed scope of work for a limited investigation to evaluate the nature of impact to the surface soil in the immediate area of MW 0034.

Monitoring Wells 0113 and 0114

Monitoring well 0113 and 0114 information indicates that these wells were installed with screens at two separate depths within each well (DOE 1995b). MW 0113 was installed in November 1987. The well is screened from 38.5 to 41.5 feet BGS and again at 52.5 to 55.5 feet BGS. The first screened interval is screened across a gray weathered shale and a gray limestone interface. The bottom screen is completed in blue-gray weathered shale with interbedded limestone. Depth to water (DTW) was measured at 51.41 feet from the top of well casing (TOC) on May 31, 1994.

Monitoring well 0114 was installed in May 1990. The well is screened from 36.5 to 39.5 feet BGS and 49.5 to 52.5 feet BGS. The first screened interval is across a gray fossiliferous limestone with thinly layered shale with rough fractures and a gray fossiliferous limestone with thin interlayers of gray shale. The bottom interval is also screened across the bottom of the gray fossiliferous limestone with thin interlayers of gray shale and a gray to black fossiliferous limestone interbedded with thin layers of gray shale. DTW was measured at 52.28 feet from the TOC on May 31, 1994.

Based on the potential of cross contamination and contaminant migration, it may be necessary that an RSE/AM be prepared to evaluate the suitability of MWs 0113 and 0114 for an IRA and potential remedial alternatives. The alternative of well abandonment could be proposed versus an RSE/AM.

Dry Wells

MWs 0042, 0115, 0242, 0323, and 0385 were observed to be dry on May 31, 1994. These wells provide potential pathways to the subsurface from cracked casing, unsealed well caps, or improper construction. Based on the potential for these wells to provide a pathway to the subsurface an RSE/AM can be prepared to evaluate if an IRA is appropriate or a determination can be made to just abandon the wells.

Sediment Clogged Well

MW 0033 was observed to be clogged with approximately 10 feet of sediment (DOE 1995b). The top of the screen was recorded at 31.5 feet from TOC. The well screen was not observed during well reconnaissance activities, camera refusal was recorded at 25.2 feet from TOC. The amount of sediment in the well suggests that the well was not constructed properly, limiting the usefulness of the well for monitoring activities. In addition, this well may provide a pathway for surface or subsurface contaminants to migrate further into the subsurface (i.e. unsecured cap, cracked casing, and improper well construction.) An RSE/AM will likely include abandonment of the well and sampling of the sediment from the bottom of the well in order to evaluate the presence of existing contaminants prior to abandonment.

3.2.2 Repair/Replace Damaged Sewer Lines & Remediate Soil Contamination

Video survey and inspection of sanitary and storm sewer lines within OU-2, conducted as a part of Phase I activities identified numerous areas of defective or damaged pipe, potentially-leaking pipe joints and connections (Plates B-1, B-2, B-3 in the Subsurface Utility Evaluation Technical Memorandum, DOE 1994). These areas provide many pathways for contaminants and water to be introduced to the subsurface. Liquids leaking from these sewer lines may be a source of contaminants found in the Main Hill seeps .

3.2.2.1 Sanitary Sewer Lines

Numerous locations of questionable integrity were identified during the video inspection survey of the sanitary sewer lines. Features such as offset joints and surface cracks in the pipe were identified during the inspection.

At other locations, it was apparent that the integrity of the pipe had been compromised (crushed pipe, large holes, leaking joints). These locations, summarized in Table III.1, are likely contributors of contaminants to the subsurface environment of OU-2. In addition to human waste transported in these lines, laboratory sinks and sumps have also been reported to drain into the sanitary sewer system. Contaminants from the sinks and sumps may include volatile organic compounds (VOCs), and radiologic parameters. The damaged pipe sections and joints also provide a pathway for water to enter the subsurface environment of OU-2; this water may contribute to seep flow and subsurface migration of contaminants already present. Severely damaged sections of sewer line should be considered as priority areas for remedial actions.

3.2.2.2 Storm Sewer Lines

Numerous locations of questionable integrity were identified during video inspection of the storm sewer lines within OU-2. Table III.2 provides a summary of major integrity defects that may provide a pathway for water and potential contaminants to enter the subsurface from the sewer lines or enter the sewer lines from the subsurface.

Table III.1. Major Integrity Defects - Sanitary Sewer Lines

Location	Defect Type	Other Justification
SE corner, I Bldg	Hole in pipe, leaking joints	Near soil gas hot spot (1992 soil gas survey; radon detected in manhole air screening prior to video survey
A Bldg courtyard	Separated and badly offset joints	Along proposed bedrock fracture with Seep 607
N of G & GW Bldgs	Crushed pipe	Target VOC's detected in same area during 1992 soil gas survey
N of Bldgs 28 & 60	Missing pipe, major cracks	Target VOC's detected in same area during 1992 soil gas survey

Table III.2. Major Integrity Defects - Storm Sewer Lines

Location	Defect Type	Other Justification
Western edge of GH parking lot	Major crack in base of pipe which extends over approximately 250 feet; major offset, open, and leaking joints	Within AOC F, immediately upgradient of AOC 6 (chromium trench
N side of OSE Bldg	Numerous cracks and offset joints in line	Located in reported bedrock swale and immediately upgradient of seeps 604/605, 606, and 607
From NE corner of P Bldg, line extends to the SE	Separated and leaking joints, holes in pipe, numerous cracks	Oil noted in line; adjacent to P Bldg fuel oil UST's, and FOSRA area; upgradient of open lined surface drainage
SE of I Bldg	Leaking joints, numerous offset joints and cracks	Near soil gas hot spot area from 1992 survey; adjacent to damaged section of sanitary sewer line
NW of I Bldg	Leaking and offset joints, numerous cracks	Near soil gas hot spot area from 1992 survey; upgradient from seep 601; portions of this are open surface drainage
OSE Bldg parking lot	Leaking and offset joints, cracks	Upgradient from seeps 604/605, 606, and 607
N of A Bldg and OSW Bldg	Leaking joints and crushed pipe; numerous offset joints and cracks	Upgradient of seep 608

Based on the potential of contaminant migration to the subsurface and potential drinking water supplies and surface water sources, it is recommended that an RSE/AM be prepared to evaluate the suitability of each damaged area for an IRA. Prior to the replacement or repair of damaged sewer lines, it is recommended that a limited dye tracer study be conducted seperate from planned Phase III activities. This study should be considered due to the potential of altering or limiting the source of water to the seeps, and therefore limiting efforts to characterize the source of contaminants reported in the seeps.

3.2.3. Leaking or Damaged Sumps and Tanks

Several sumps and tanks within OU-2 were observed with evidence of past releases, ruptures, or the potential of a release of hazardous substances to the environment. These sumps and tanks along with the

surrounding areas are recommended for IRAs, which will likely include repair/replacement of damaged sumps and tanks or components and removal of impacted media, as necessary.

Sump 268 located in H Building's breeze way near the laundry room was reported to have damaged piping that leaks whenever the sump is running. Additional documentation will be reviewed in Phase II, to identify the source of water to the sump, in order to evaluate the potential affect on human health and the environment.

AST 17 is a 1,000-gallon aboveground storage tank located south of HH Building. The bottom of this tank is ruptured and roped off with signs marked caustic. The AST should be removed and the area that is roped off remediated to prevent further migration of contaminants to the subsurface and potentially to groundwater and surface water drainage areas.

Staining was observed adjacent to several tanks within OU-2. Tanks 7,8,9, and 10 are used to store alpha waste water in WD building. Staining on the floor outside of these tanks was noted in the Subsurface Utility Technical Memorandum (DOE 1994). Also AST 11 was observed with stained concrete immediately outside of the metal building housing the emergency generator tank. Based on the potential for direct exposure to Mound Plant personnel and the potential for migration of these contaminants to the subsurface which may affect drinking water supplies an IRA is recommended for these tanks. The preparation of an RSE/AM will evaluate the suitability of an IRA to remediate these tanks and identify potential remedial options.

3.2.4 Repair/Replace Damaged or Leaking Surface Drainage Features

Numerous locations of potential infiltration to the subsurface were identified during Phase I field activities. Several of these surface drainage features receive water from storm sewers and foundation drains. Damaged or leaking surface drainage areas may provide a pathway for contaminants associated with the foundation drains or sewers to migrate to the subsurface or enter other surface water areas. The areas identified during the field reconnaissance are presented in Table III.3.

Table III.3. Potential Areas of Infiltration and Leakage

No.	Drainage ID	Date Inspected	Description
1	USD-08-024	April 27, 1994	Sediment and debris collecting
2	USD-08-025	April 27, 1994	Small sinkhole in unlined surface drainage
3	USD-09-022	April 27, 1994	Standing water
4	USD-09-028	April 27, 1994	Standing water
5	USD-08-024	April 27, 1994	Standing water
6	USD-08-024	April 27, 1994	Saturated soil in surface drainage
7	LSD-05-017	April 26, 1994	Sediment and debris collecting
8	USD-08-024	April 27, 1994	Standing water
9	USD-05-027	April 28, 1994	Standing water
10	LSD-05-026	April 28, 1994	Standing water
11	LSD-10-100	July 26, 1994	Sediment and debris collecting
12	LSD-05-016	April 26, 1994	Cracked and broken concrete in lined surface drainage
13	USD-11-021	April 27, 1994	Standing water, drain is plugged
14	LSD-06-004	July 26, 1994	Cracked and broken concrete in lined surface drainage
15	LSD-05-100	July 26, 1994	Hole under inlet, water runs under lined surface drainage
16	LSD-10-013	April 26, 1994	Standing water and cattails in surface drainage
17	USD-08-025	April 27, 1994	Cracked and broken concrete in lined surface drainage
18	LSD-11-019	April 27, 1994	Sediment and debris collecting

Based on the potential of contaminant migration to the subsurface, impact to potential drinking water supplies and surface water sources, it is recommended that an RSE/AM be prepared to evaluate the suitability of each damaged area for an IRA.

3.2.5. Remediation of Areas With Elevated VOC Concentrations

Elevated VOC concentrations were reported in the soil vapor within OU-2 in 1992 and 1994 (DOE 1995a). These elevated readings (greater than 1,000 ppb) were reported in the vicinity of seven OU-2 buildings (DS, G&GW, HH, I, M, PS, and WD Buildings). Table III.4 shows highest elevated concentration (greater than 1,000 ppb) of reported compounds for each building.

Based on existing site information pertaining to past waste management practices and previous investigations, the 1994 soil vapor survey (DOE 1995a) showed hazardous substances exist in several areas within OU-2.

One example of elevated VOCs is the presence of elevated PCE concentrations in the vicinity of I Building, a potential source of PCE in Seep 0601 located downhill and southwest of I Building. The potential for elevated VOC concentrations in the soil within OU-2 to impact groundwater and surfacewater sources (seeps) justify the preparation of RSE/AM. These memoranda will evaluate the suitability of each area for an IRA and present potential remedial options. In addition, limited soil sampling activities may be included in order to characterize the soils for remedial options and waste disposal.

3.3 PREPARATION OF REMOVAL SITE EVALUATION/ACTION MEMORANDA

RSE/AM will be prepared to evaluate the appropriateness of a removal actions as outlined by 40 CFR 300.415(b)(2)and possible remedial options. The evaluation will include the following factors:

(i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants.

(ii) Actual or potential contamination of drinking water supplies or sensitive ecosystems.

(iii) Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release.

(iv) High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface which may migrate.

(v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released.

(vi) Threat of fire or explosion.

(vii) The availability of other appropriate federal or state response mechanisms to respond to the release.

Table III.4. Highest Elevated VOC Concentrations Reported

Location	Compound	Concentration (ppb)
DS Building	Freon 113	49,480.5
G & GW Building	Cis-1,2-DCE	1,767.7
	Trans-1,2-DCE	1,767.7
	1,1,1-TCA	2,982.5
	Freon 11	2,321.4
HH Building	Toluene	23,142
I Building	Toluene	4,788
	PCE	1,191
M Building	Cis-1,2-DCE	3,787.9
	Trans-1,2-DCE	4,297.9
	Toluene	1,052.6
	1,1,1-TCA	3,333.3
	Freon 11	22,500
	PCE	3,235.5
PS Building	Cis-1,2-DCE	5,808.1
	Trans-1,2-DCE	6,818.2
	1,1,1-TCA	5,263.2
	1,1-DCA	12,098.8
	Freon 11	15,892.9
WD Building	Cis-1,2-DCE	1,515.2
	1,1-DCA	1,975.3
	Toluene	20,526.3
	Freon 11	8,571.4

Cis-1,2-DCE = Cis-1,2-Dichloroethene
Trans-1,2-DCE = Trans-1,2-Dichloroethene
1,1,1-TCA = Trichloroethane
PCE = Tetrachloroethene
1,1-DCA = 1,1-Dichloroethane
ppb = parts per billion

(viii) Other situations or factors that may pose threats to public health or welfare or the environment.

In addtion to evaluating the appropratness of an IRA the RSE/AM will likely include a desription of the site background, preparing the objectives of the IRA, identifying and screening potential remidial options, a detailed analysis of remedial alternatives (including effectiveness, implementability, and cost), and a recommendation for the remedial action.

4. RECOMMENDATIONS FOR ADDITIONAL INVESTIGATIONS

4.1. SEISMIC INVESTIGATION

Additional, seismic data is recommended to be collected on the Main Hill to further define the bedrock surface configuration within OU-2. Seismic data collected under the OU-9 Scope of Work and OU-2 Phase I activities will be incorporated into the interpretation of the bedrock configuration. Seismic data will be updated to define the

- depth to top of weathered bedrock (if present) and competent bedrock;
- configuration of the weathered bedrock and competent bedrock surface (i.e. bedrock channels or lows where preferential migration may be occurring);
- seismic wave travel time velocity in unconsolidated overburden, weathered bedrock, and deep competent bedrock. Travel time velocity relates directly to the physical properties (i.e. density, mineral composition, porosity, and water saturation) of the material;
- thickness of the unconsolidated deposits and weathered bedrock zone; and
- insight into the presence and location of fractured bedrock zones.

The success of most geophysical techniques is directly related to site-specific conditions. Potential complications exist on the Main Hill that may interfere with quality of the seismic data. Seismic methods measure all nearby ground vibrations and, therefore, are susceptible to a variety of natural and cultural noises. Vehicular traffic or other sources of seismic waves may mask signals from refracted layers.

4.2. SUBSURFACE UTILITIES

A continued review of all building, utility drawings, and as-built drawings is recommended to update and confirm the existing subsurface utilities on the Main Hill as they were presented in the OU-2 Subsurface Utility Technical Memorandum (DOE, 1995a). Some of the subsurface utilities have been located, video surveyed, and mapped. Inaccessibility (i.e. manholes or cleanouts) to some of the subsurface utilities will be addressed during OU-2 Phase II RI/FS activities.

Additional inspections of previously uninspected storm and sanitary lines are recommended to assess the integrity of these lines. These activities would likely require obtaining access to previously inaccessible areas. This investigation may include a dye tracer study of storm and sanitary lines smaller than 8 inched in diameter and may be performed seperately or inconjunction with other dye tracer studies using these lines (i.e., seep source investigation) or hydrostatic/ pressure testing of lines constructed of PVC materials and which have

manholes or cleanouts at two end points of the test line. Also, soil sampling along the 8 inch lines may be performed to assess releases due to leaks.

4.3. SUMPS AND TANKS

A physical inspection is recommended for sumps and tanks identified in restricted areas within OU-2. Sumps or tanks that have been removed from service since the completion of Phase I field activities will be assessed and verification sampling performed to determine if the results meet the data quality objectives established for the OU-2 RI/FS.

4.4. ADDITIONAL SOIL SAMPLING

Soil samples, as proposed in the OU-2 RI/FS Work Plan, should be modified to include areas identified as potential sources as a result of Phase I activities. These areas would include the collection of sampling along underground utility lines in areas of potential or identified damage, and areas with soil vapor VOC readings of less than 1,000 ppb as identified during Phase I activities.

5. REFERENCES

DOE, 1986. "Phase I: Installation Assessment Mound (Draft)", Comprehensive Environmental Assessment and Response Program. U.S. Department of Energy, Albuquerque Operation Office, Albuquerque, New Mexico, April 1986.

DOE, 1994. "Subsurface Utility Evaluation", Operable Unit 2, Main Hill - Phase I Technical Memorandum (Draft). U.S. Department of Energy, Albuquerque Field Office, Alburquerque, New Mexico, November 1994.

DOE, 1995a. "Soil Vapor Reconnaisance", Operable Unit 2, Main Hill - Phase I Technical Memorandum. U.S. Department of Energy, Ohio Field Office, Miamisburg, Ohio, February 1995.

DOE, 1995b. "Evaluation of Existing Monitoring Wells", Operable Unit 2, Main Hill - Phase I Technical Memorandum. U.S. Department of Energy, Ohio Field Office, Miamisburg, Ohio, February 1995.

DOE, 1995c. "Characterization of Main Hill Seeps and Foundation Drains", Operable Unit 2, Main Hill - Phase I Technical Memorandum. U.S. Department of Energy, Ohio Field Office, Miamisburg, Ohio, February 1995.

MRC, 1985. Carfagno, D.G., and B.M. Fasner, "The Mound Site Development and Facilities Utilization Master Plan". Monsanto Research Corporation report MLM-ML-85-44-0002. Miamisburg, Ohio, April 1985, revised December 1987.

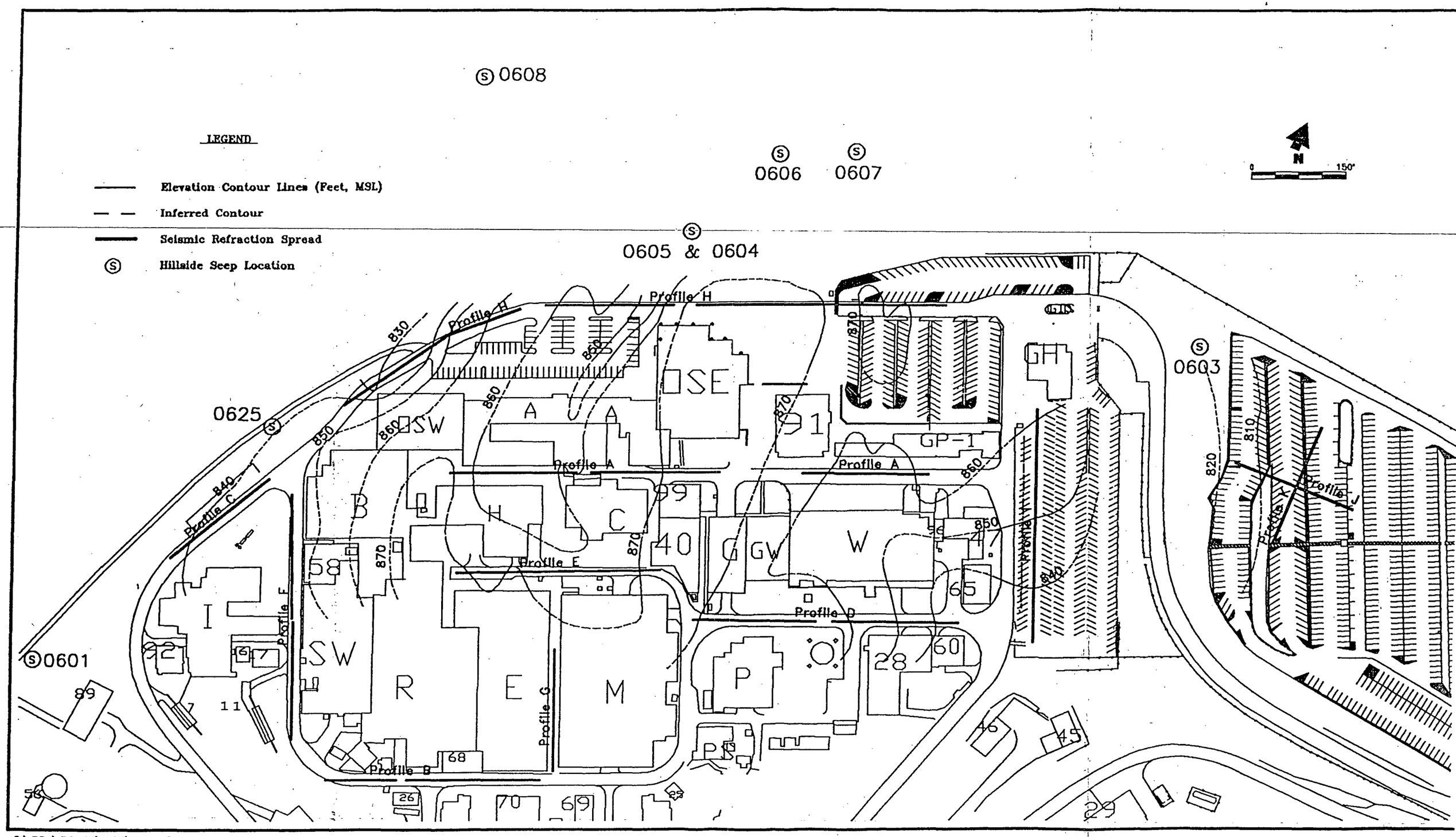


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Figure 2.1. Seismic Layer V2 Contour Map

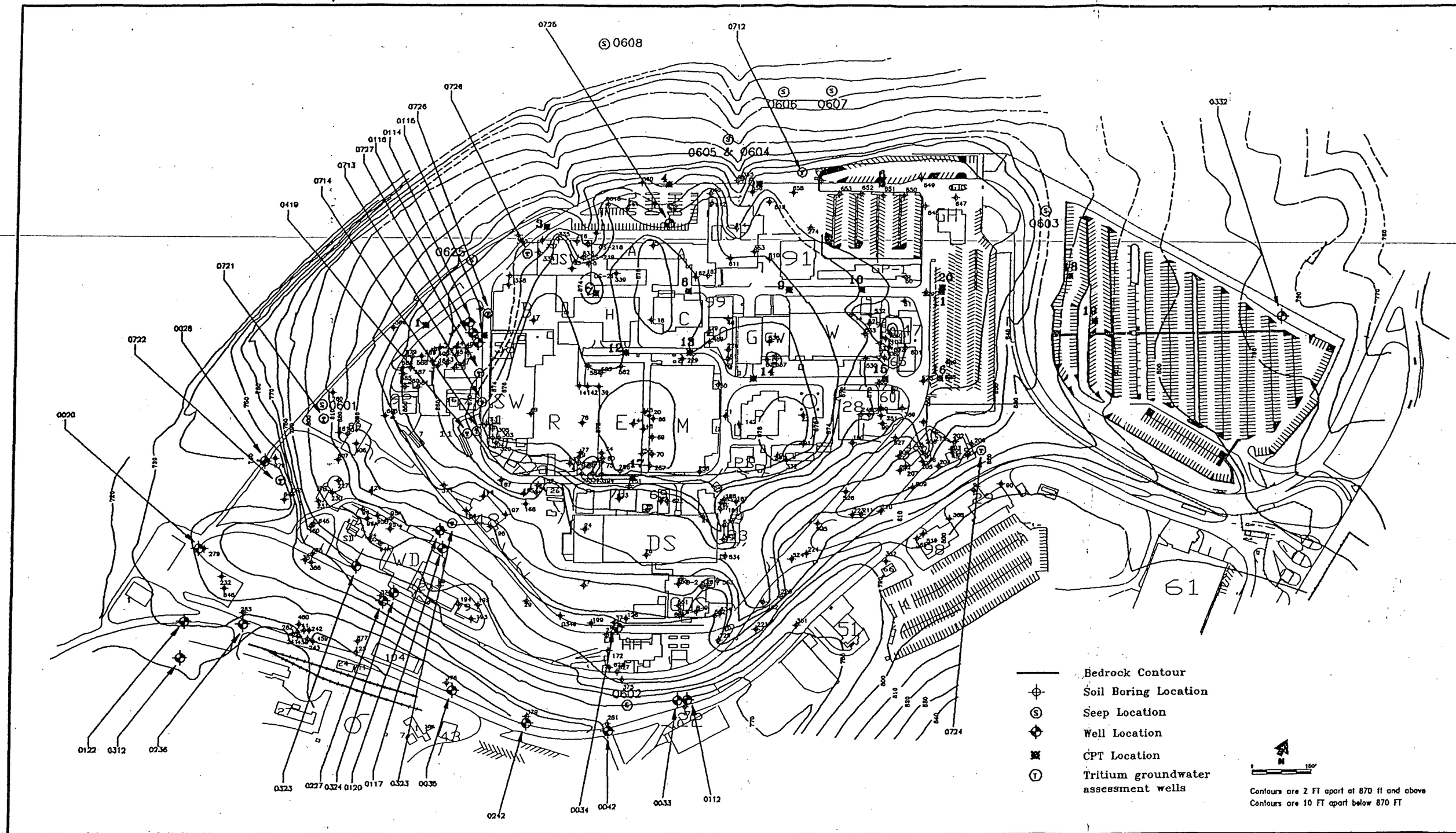

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Figure 2.2. Top of Highly Fractured Bedrock M

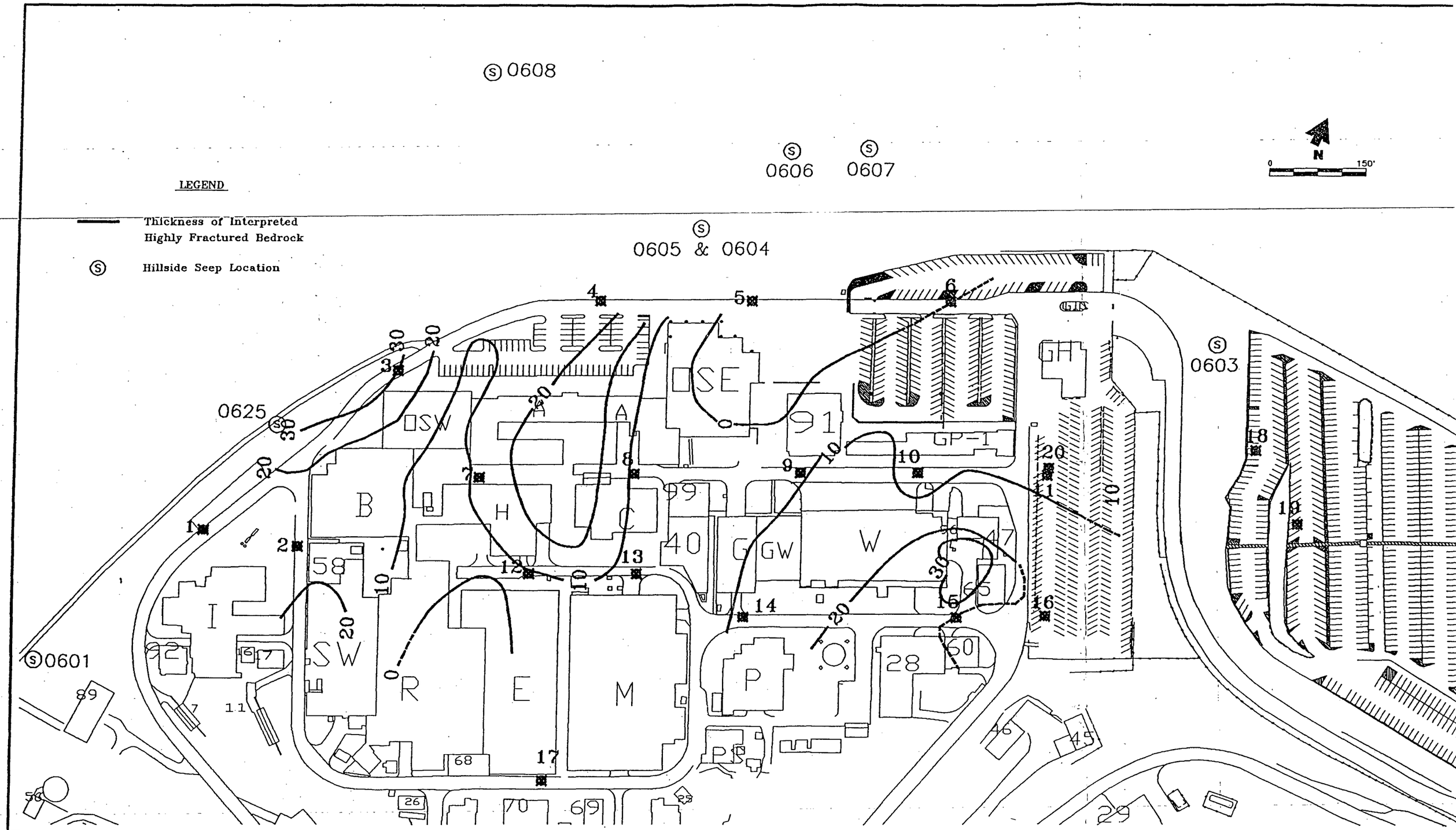

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Figure 2.3. Isopach Map - Interpreted Zone of Highly Fractured Bedrock